STUDIES UPON THE TAXONOMY OF THE MADINAE

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In the course of several seasons' work upon the taxonomy of the Madinae, the "tarweed" subtribe of Compositae, the following records, among others, have been brought to light. Because the final monographic treatment of this group, which is to cover the results of garden experiments, as well as the cytologic, genetic and systematic aspects, will not be completed for a number of months, it is desirable to record nomenclatorial changes and describe certain groups at this time in order that the proper names for these entities may be generally available. Full citation of specimens and synonymy is reserved for the later treatment.

It should be brought to attention that the recent paper of Dr. D. A. Johansen on "Cytology of the Tribe Madinae, Family Compositae" [1] gave informal reference to several of the names that are taken up here. The present writer supplied Johansen with all the appellations used. Inasmuch as these were employed as common names, being placed in quotation marks, in a non-taxonomic paper, by one who not only pointed out their tentative nature but also disclaimed all intent of making nomenclatorial changes, he and we do not intend to credit them with any nomenclatorial standing.

Madia

The two largest species of Madia are exceedingly polymorphous and are composed of the following subspecies:

Madia sativa Molina subsp. **typica** nom. nov.—*M. sativa* Mol. Sagg. Chile ed. 1, 136, 1782.

Madia sativa subsp. capitata (Nutt.) Piper, Contr. U. S. Nat. Herb. 11: 576, 1906.

Madia sativa subsp. **dissitiflora** (Nutt.) comb. nov.—*Madorella dissitiflora* Nutt. Trans. Am. Phil. Soc. II, 7: 387, 1841. *Madia dissitiflora* Torr. et Gray, Fl. N. Am. 2: 405, 1843. *M. sativa* var. *dissitiflora* Gray, Proc. Am. Acad. 9: 189, 1874.

Madia elegans Don subsp. **typica** nom. nov.—*M. elegans* Don in Lindl. Bot. Reg. 17: t. 1458, 1831.

Madia elegans subsp. **densifolia** (Greene) comb. nov.—*M. densifolia* Greene, Pittonia 3: 167, 1897. *Madaria densifolia* Greene, Fl. Franciscana 417, 1897. *Madia elegans* var. *densifolia* Jepson, Fl. W. Mid. Calif. 528, 1901.

Madia Wheeleri (Gray) comb. nov.—*Hemizonia Wheeleri* Gray, Bot. Calif. 1: 617, 1880. The type came from Monache Meadows, Tulare County, California. This species occurs in the

[1] Bot. Gaz. 95: 177–208, 1933.

southern portion of the Sierra Nevada and in the San Antonio, San Bernardino and San Jacinto ranges of southern California. This plant is a close relative of *M. elegans* and its affinity here has not been recognized up to this time because its ray-akenes conform in width to the key-character type of Hemizonia. In other details, however, its ray-akenes are of the Madia type and other technical characters place it definitely in this genus.

Madia exigua (Smith) Gray, Proc. Am. Acad. 8: 391, 1872. The indexes and later authors have missed this publication of the combination, universally attributing it to Greene, Erythea 1: 90, 1893.

Madia nutans (Greene) comb. nov.—*Callichroa nutans* Greene, Pittonia 2: 227, 1892. *Blepharipappus nutans* Greene, l. c., 247. *Layia nutans* Jepson, Fl. W. Mid. Calif. ed. 2, 449, 1911. The closest relative of this plant is the following new species and both are local endemics in neighboring parts of the same general region. Together with *M. Rammii* Greene and *M. yosemitana* Parry, they form a common group of species.

Madia Hallii sp. nov. Annua, pumila, 5–18 cm. alta; caule superne divaricato 2–5-chotomo glanduloso-pubero; foliis subradicalibus numerosis anguste linearibus albo-hirsutis subintegerrimis, 5–20 vel 30 mm. longis, 0.7–1.7 mm. latis; pedunculis dense glandulosis nudis capillaribus elongatis 1–5 cm. longis monocephalis atropurpureis; involucro turbinato, 4.5–5.2 mm. alto, squamis linearibus crispe pilosis et cum paucis glandulis stipitatis breviter acuminatis; corollis luteis, radii 3–6, ligula flabelliformi 4.5–5.5 mm. longa, 6–8 mm. lata, disci 8–20 fertilibus 2.5–3 mm. longis, tubo pubenti, faucibus glabris, dentibus limbi hispidulis; antheris semi-exsertis, luteis; acheniis radii linearis paululum lateraliter compressis arcuatis nigris levibus, disci strictis 4–5-costatis, stipite dilatato; pappo (radii discique consimili) ca. 10-paleaceo brevissimo (0.2–0.3 mm. longe), paleis oblongis quadratisve erosa-fimbrillatis.

Inner Coast Range of eastern Lake and Napa counties, California, at elevations of 500 to 900 meters. *Type:* Near Knoxville, northeastern Napa County, May 27, 1931, *H. M. Hall 13094* (Dudley Herbarium of Stanford University; isotypes Berlin, CI, Gray, Kew, Mo, NY, UC, US). Other collections: Knoxville, *Baker 3079* (CA, Delessert, Gray, Kew, NY, Po, UC, US); west of Leesville, Lake County, *Heller 13123* (CA, CI, Del, DS); Lower Lake; Butts Canyon.

This very distinctive species is named in honor of the late Dr. H. M. Hall, who not only collected the type, but had long recognized this as an unnamed species and had studied it. Dr. Greene, in the course of routine determinations of the Baker sets, proposed a name by which this has been distributed to many herbaria as an unpublished species of Anisocarpus.

Adenothamnus

Adenothamnus, gen. nov.—Capitula heterogama, radiata, multiflora, floribus radii ligulatis femineis 1-seriatis fertilibus discique tubulosis hermaphroditis plus minusve fertilibus. Involucrum campanulatum, bracteis 1-seriatis subaequalibus herbaceis carinatis achaenia exteriora arte involventibus. Receptaculum convexum, in ambitu paleis chartaceis connatis circa flores hermaphrodites exteriores, in centro dense villosum. Corollae femineae tubo tenui, lamina patente, breviter 3–4-fida; hermaphroditae tubulosae, fauce paulla ampliata, limbo 5-dentato. Achaenia minute striata, radii oblonga, paulla incurva, a latere compressa, calva; disci nunc subcylindracea, nunc tenuia vacuaque, setis pluribus subaequalibusque 1-seriatis breviter plumosis.—Suffrutex erectus, corymboso-ramosus, totus glanduloso-pubescens. Folia alterna, integerrima, sessilia. Capitula majuscula, solitaria. Corollae flavae. Achaenia disci parce strigillosa, radii glabra. (*Aden,* gland + *thamnos,* shrub.)

Known only from the following species which is, accordingly, the type.

Adenothamnus validus (Brandegee) comb. nov.—*Madia valida* Brandegee, Zoe 4: 206, 1893. This anomalous plant is known only from the type collection made at San Antonio (now known as San Antonio del Mar), Lower California, by T. S. Brandegee, June 4, 1893. The type is at the University of California. This species differs from all those of the genus Madia in its shrubby habit, densely stipitate-glandular herbage quite lacking in other pubescence below the uppermost leaves and stems, large oblong heads, essentially glabrous corollas and in the numerous elongated plumose pappus-bristles. Although the technical characters of the heads for the most part find counterparts in one or another species of that genus, showing a degree of relationship between the two genera, the aspect of this plant is entirely foreign to Madia.

Hemizonia

Hemizonia, section Olocarpha DC. Prodr. 5: 692, 1836. As published, this section contained two species *H. luzulaefolia* DC. and *H. macradenia* DC. in that order. *Hemizonia luzulaefolia* is now universally regarded to be associated with *H. congesta* DC. in the section *Euhemizonia.* Holocarpha as a genus, with its single species *H. macradenia,* was described by Greene, Fl. Franciscana 426, 1897, thereby setting the type of DeCandolle's section. We have concluded that four other species are phylogenetically associated with *Hemizonia macradenia* DC. and should be included in this section, namely, *H. virgata* Gray, *H. Heermannii* Greene and the two following new species:

Hemizonia obconica Clausen et Keck, sp. nov. Annua erecta 2–8 dm. vel ultra altitudine; caule rigido infra mediam partem saepius simplici supra divaricato-ramoso a basi patenter hispido superne viscido glutinosoque; foliis linearibus vel lineari-oblanceolatis, inferioribus inciso-dentatis hispidulis basi longe attenuatis, superioribus integerrimis, summis minimis apice glandulosotruncatis; pedicellis moderate longis divaricatis; capitulis paniculatis; involucro obconico, 4–5 mm. alto, squamis cum paucis glandulis rigido-stipitatis ornatis ceteroqui glabris vel subglabris; antheris luteis.

Scattering colonies in the Coast Ranges from Contra Costa County to western Fresno County and in the Sierra Nevada foothills of Fresno and Tulare counties, all in California. *Type:* Part way up grade one half mile north of Tesla, Alameda County, at *ca.* 300 m. elevation, *Keck & Stockwell 2501* (Dudley Herbarium; isotypes to be distributed).

The specific name denotes the common shape of the involucre, a character distinguishing this species from *H. virgata* and *H. Heermannii.* It is readily distinguished from *H. Heermannii* by the lack of dense puberulence above, the few (20 or less) gland-tipped processes of the involucral bracts and the broad receptacle; from *H. virgata* it differs in anther-color, paniculate arrangement of the heads and hispid lower herbage. *Hemizonia obconica* has been confused hitherto with *H. virgata* and its distinctive characteristics were not observed clearly until cytological studies had shown that two species were involved in the *H. virgata* complex. *Hemizonia obconica* is a species with a haploid chromosome-number of 6[2] (like *H. Heermannii*), while in *H. virgata* the number is 4. The species do not form fertile hybrids whether growing side by side in nature or as the result of artificial garden crossings.

Hemizonia vernalis sp. nov. Annua erecta gracilis simplex 15–22 cm. alta omnino hirsuta superne paululum viscida; foliis alternis (infimis paucis oppositis), inferis lineari-oblanceolatis acutis argute incurvo-serratis, superis sessilibus integris scabriusculis, superissimis aliquanto bracteatis laxis; capitulis paniculatis ad apicem caulis aggregatis; involucro 5–6 mm. alto, squamis hirsutis cum ca. 5–10 rigide adscendentibus stipitibus apice glandulam truncatam gerentibus; paleis receptaculi discum totum occupantes intimis hyalinis linearibus apice pubente; corollis luteis, radii 8–10, disci 20–35; antheris nigris; acheniis radii fertilibus anguste obovatis ca. 4 mm. longis olivaceo-nigris apice intus breviter rostratis, disci sterilibus.

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[2] Chromosome numbers in this paper have been supplied by Dr. J. Clausen.

Known only from the type collection taken at Base Camp (of the San Joaquin Light and Power Company), junction of the North and South Forks of Kings River, Fresno County, California, March 10, 1923, *W. B. Duncan* (Dudley Herb., No. 125323). This station is between 300 and 700 m. elevation.

This slender vernal herb, hirsute throughout and very lightly glandular, is decidedly distinct from the other species of this section, which are autumnal, glutinous and viscid.

Hemizonia fasciculata (DC.) Torr. et Gray subsp. **typica** nom. nov.—*Hartmannia fasciculata* DC. Prodr. 5: 693, 1836. *Hemizonia fasciculata* Torr. et Gray, Fl. N. Am. 2: 397, 1843.

Hemizonia fasciculata subsp. **ramosissima** (Benth.) comb. nov.—*H. ramosissima* Benth. Bot. Voy. Sulph. 30, 1844. *H. fasciculata* var. *ramosissima* Gray, Syn. Fl. 1^2: 310, 1844.

Hemizonia Lobbii Greene subsp. **typica** nom. nov.—*H. Lobbii* Greene, Bull. Torr. Club 9: 109, 1882. *H. fasciculata* var. *Lobbii* Gray, Syn. Fl. 1^2: 310, 1844. *Deinandra Lobbii* Greene, Fl. Franciscana 425, 1897.

Hemizonia Lobbii subsp. **pentactis** subsp. nov. Caule patenter hirsuto; foliis viridibus albo-pilosis; involucri squamis hispidulis parce glandulosis; ligulis 5; fl. disci 6.

Salinas Valley, California, from the region to the east of King City south-eastward to the headwaters of the Estrella River. *Type:* East side of the Salinas River, opposite San Miguel, San Luis Obispo County, April 27, 1934, *Keck & Clausen 2836* (Dudley Herb.; isotypes CI, UC, Kew, G).

This subspecies differs from subsp. *typica* in the flower-number but is not otherwise separable. Both subspecies have individual geographic ranges, but meet at a number of points and there intermediate types occur abundantly. The more glandular, 5-rayed form from the vicinity of Stanford University, Santa Clara County, may be tentatively referred to subsp. *pentactis*. *Hemizonia Lobbii* differs from *H. fasciculata,* with which it has frequently been confused, by the pinnatisect basal leaves with linear lobes, the low, intricately branched habit, the grayish cast to the herbage caused by the abundant white hairs, the pustulate hairs of the involucral bracts and the separate geographic range to the northward of *H. fasciculata.* The two species differ in chromosome-number (*H. fasciculata* n = 12; *H. Lobbii* n = 11) and we have failed in our attempts to form hybrids between them.

Hemizonia pallida sp. nov. Annua omnino villosa-hirsuta; caule erecto 2–8 dm. alto stricto albo e basi vel superne adscendenter ramoso in inflorescentiam glandulis stipitatis parce adsparsis; foliis alternis, inferioribus linearibus vel oblanceolatis argute dentatis 5–10 cm. longis 3–6 vel 10 mm. latis, superioribus integerrimis gradatim reductis; corymbis ramos terminantibus planiusculis vel rotundatis; capitulis multis brevi-

pedunculatis; involucro late campanulato vel hemisphaerico 4.5–6.5 mm. alto, 5–8 mm. lato, squamis lanceolatis acutis acuminatisve hispido-hirsutis et glandulari-puberulis, marginibus ciliolatis; paleis receptaculi inter radium et discum gerentibus breviter hirsutis et superne brevissime glandulari-puberulis connatis; corollis flavis, radii 8–12, ligulis conspicuis cuneatis 6–10 mm. longis, tubo glandulari-pubescenti, disci 10–25, 3.4–4.4 mm. longis extus cum glandulis subsessilibus ornatis supra mediam partem abrupte ampliatis; antheris flavis; acheniis radii 2.2–2.8 mm. longis obovatis transverse rugosis nigris, areola robuste rostrata, stipite (ad ventralem situm portatur) calloso; acheniis disci sterilibus glabris vel minutissime paululumque glandularis; pappo 4–8 paleaceo, paleis inaequalibus laciniatis vel parce fimbriatis ca. 0.8 mm. longis.

Known only from Tulare and Kern counties, California, on the plains at the head of the San Joaquin Valley, and in Red Rock Canyon on the western boundary of the Mohave Desert, at altitudes of 100 to possibly 1000 m. *Type:* Head of the San Joaquin Valley, 5.3 miles north of Grapevine, Kern County, in gravelly soil on open plain, May 6, 1933, *Keck & Heusi 2255* (Dudley Herb.; isotypes Berlin, CA, Copenh, FM, G, Kew, Mo, Phila, Po, NY, UC, US). This locality is 25 miles (40 kilometers) due south of Bakersfield.

A common plant in its range, this spring-flowering species has been generally keyed out to the early form of *H. angustifolia* DC., a black-anthered species of the coast, but its true affinities are with *H. Kelloggii* Greene and the following new species, *H. mohavensis.* The three in common have yellow-anthers, and *H. pallida* and *H. Kelloggii* differ from the other species of their section of Hemizonia in the light yellow color of their flowers and in having the chromosome number n = 9. *Hemizonia pallida* has many more flowers in both ray and disk than *H. Kelloggii* and *H. mohavensis,* each of which have five rays and six disks.

Hemizonia mohavensis sp. nov. Annua erecta herbacea undique mollissima viscida-pubescens; caule 15–30 cm. alto virgato subsimplici vel (praecique superne) divaricato-ramoso; foliis alternis, inferioribus oblanceolatis subintegerrimis basi in petiolum brevem attenuatis, superioribus integerrimis oblongo-lanceolatis obtusis basi amplexicaulibus, foliis rameis multo minoribus usque ad capitula gerentibus; inflorescentia corymboso-expansa planiuscula vel rotundata; capitulis ad apices ramorum dense glomerulis plerisque sessilibus; involucro ovato 4.8–6 mm. alto, squamis lanceolatis utroque acutiusculis dorso subcarinatis dense hirtellis et prominenter glandulari-puberulis; paleis receptaculi inter radium et discum gerentibus ad mediam connatis; corollis luteis, radii 5, ligulis conspicuis late obovato-rotundatis 5–6 mm. longis, disci 6 ca. 3.5 mm. longis extus cum

glandulis stipitatis ornatis, faucibus turbinatis tubo proprio longitudine subaequante; antheris luteis; acheniis radii plus minusve 2 mm. longis anguste obovatis 3-angulosis laevibus rugulosisve, areola gracile rostrata, stipite inverso albo-calloso; acheniis disci sterilibus supra mediam partem cum brevissime glandulari-puberulis paulo ornatis; pappo ca. 6–8 paleaceo, paleis inaequalibus in latum plerisque quadratis eroso-laciniatis brevissimis plus minusve connatis ca. 0.5 mm. longis.

Type: Mohave River, at confluence with Deep Creek, Mohave Desert, San Bernardino County, California, at 900 meters elevation, Sept. 17, 1933, *Keck 2531* (Dudley Herb.; isotype CI). Growing on low sand-bars in the river bed with Verbascum thapsus, Mimetanthe pilosa, Hemizonia Fitchii, Boisduvalia sp., etc. Only some ten plants were found. This location was visited with Mr. Louis C. Wheeler, of La Verne, who had discovered this colony earlier in the year. His number 1961 in the Carnegie Institution collections, made July 18, 1933, shows characteristics of the foliage better than the type which, however, excels in fruit characters. The only other specimen to be referred to this species was collected on the Banning-Idyllwild Road, on the northwestern side of Mount San Jacinto, Riverside County, *Munz & Johnston 8880* (Pomona College). The label reads, "single plant in clearing in chaparral," and the slender stem is unbranched with spicate arrangement of the heads below the terminal glomerule of 4 or 5 members.

Southern California has been intensively explored botanically, at least in these regions, so we must infer that this species is exceedingly rare and in a precarious position as regards extinction. Fortunately we have been able to grow a few plants in the garden and so study the species further. Its haploid chromosome number in common with *H. Lobbii* is eleven. But it will surely never be confused with that species. Its flower-number is the same as *H. fasciculata* and *H. Kelloggii* and from consideration of its characters as a whole it may be said to stand between those species. The soft glandular pubescence separates it from *H. fasciculata* while the congested heads of *H. mohavensis* are never approached in *H. Kelloggii.* In addition, *H. mohavensis* differs from every other tarweed in the details of its minute pappus-paleae.

Hemizonia paniculata Gray subsp. typica Hall nom. nov.—*H. paniculata* Gray, Proc. Am. Acad. 19: 17, 1883. In his original description Gray indicated the number of disk-flowers as 10 to 12. No type specimen was pointed out, but the collectors were named in the following order: *Brewer, Parish, Jared.* As the number of disk-flowers per head on the Brewer specimen is at least 15, which is considerably above the 10 to 12 given by Gray, this indicates the original description was not based upon the first specimen cited, at least as to this important feature,

and also because of the fragmentary nature of this specimen it is excluded from consideration as the type. The Parish collection referred to is *Parish 1419,* from near Temecula, and was the only plant from this collector in the Gray Herbarium at that time, and since this agrees very well with the original description it is now selected as the type. This leads to southern California as the type locality and to the southern form as subsp. *typica.* It occurs from Riverside County to northern Lower California.

HEMIZONIA PANICULATA subsp. **increscens** Hall subsp. nov. Tota breviter pubescens praesertim superne stipitata-glandulosa; corollis radii luteis 8–13, disci 14–30.

Common in open fields in northern Santa Barbara County and southern San Luis Obispo County; infrequent northward to the lower Salinas Valley, Monterey County, all in California. *Type:* 7.5 miles (12 km.) southwest of Arroyo Grande, San Luis Obispo County, June 7, 1931, *H. M. Hall 13136* (Dudley Herb.; isotype CI).

Hemizonia paniculata may be divided rather satisfactorily into a northern and a southern subspecies, these differing from each other in the number of disk-flowers. In the north this number is 14 to 30, in the south it is only 8 to 13. Between the two there is a geographic gap of about 270 km. (170 mi.) over which the species is entirely lacking. Although no appreciable difference other than number of disk-flowers has been found (aside from a resulting modification in size and shape of head) it is believed that there is here a definite and real systematic as well as geographic separation. There is a slight amount of overlapping in number of flowers among inland plants of subsp. *increscens* in which it may fall as low as 10 in smallest specimens, but the number rarely falls below 14 and the average for the subspecies is close to 20. This information is based on a large number of counts and is found to be statistically very significant.

Subspecies *increscens* is composed of two distinguishable races, one that occurs in the valleys opening directly to the sea in which the ray-flowers are usually 13 but varying to 10, the other appears further inland and the number of rays is consistently 8 (like subsp. *typica*). Where these races meet all intermediate numbers are found. The type is characteristic of the former of the two.

These notes on *H. paniculata* have been taken largely from manuscript of Dr. Hall, who made intensive field studies of the species and took exhaustive flower-counts. He proposed the name *increscens,* had discussed the subspecies in a public lecture[3] and was preparing to publish it.

[3] Hall, H. M. "Heredity and Environment—as Illustrated by Transplant Studies," Sci. Month. 35: 301, 1932.

Hemizonia martirensis sp. nov. Tota glabrata; caule erecto a basi parce hispido ceteroqui glabro rubello-brunneo ca. 3–5 dm. alto; foliis alternis, inferioribus junioribus ignotis, superioribus subintegerrimis saepe bidentatis semiamplexicaulibus obscure scabro-hispidulis, foliis ramulis multo minoribus (3–7 mm. longis) subimbricatis linearis adpressis integerrimis glaberrimis aliquando glandulari-subpunctatis; inflorescentia dure paniculata sed laxiuscula; pedicellis viscidis; involucro hemisphaerico ca. 5 mm. alto, squamis lanceolatis rotunde complicati dorso dense glanduliferis non pubescentibus, margine breve ciliata; paleis receptaculi inter radium et discum gerentibus ad mediam connatis; corollis flavis, radii 8, ligulis conspicuis obovatis 6–7.5 mm. longis, disci 11–21, 5 mm. longis extus cum minutissimis glandulis stipitatis ornatis; antheris flavis; acheniis radii 2.5–3 mm. longis obovatis leviter transverse rugosis nigris, areola breviter et robuste rostrata, stipite calloso; acheniis disci omnino sterilibus paululum viscido-puberulis; pappo plerisque 7–10 paleaceo, paleis anguste oblongo-attenuatis paulo laciniato-fimbrillatis.

Type: granitic soil of foothill region at base of San Pedro Martir Mountains, in immediate vicinity of San Jose, 25 miles east of San Telmo, Baja California, Mexico, Feb. 23, 1931, *Ada Meling 2* (Dudley Herb.; isotype CI). Not otherwise known. Miss Meling collected several numbers on her father's ranch at the behest of Dr. I. L. Wiggins of Stanford University, and it is to him that I am grateful for the opportunity of putting this interesting species on record. It is doubtless most closely related to *H. paniculata,* but the color of the flowers and anthers and the sterile disk-akenes indicate common characters with *H. pallida* and *H. Kelloggii.* The almost complete absence of pubescence parallels the case of *H. fasciculata.*

Hemizonia angustifolia DC. subsp. **typica** nom. nov.— *H. angustifolia* DC. Prodr. 5: 692, 1836. *H. corymbosa* (DC.) Torr. et Gray is found to belong to subsp. *typica,* being the spring-flowering form with deeply pinnatifid leaves occurring well above the middle, while the type of *angustifolia* represents the fall-flowering form with pinnatifid leaves confined to the lower portion of the plant.

Hemizonia angustifolia subsp. **macrocephala** (Nutt.) comb. nov.—*H. macrocephala* Nutt. Jour. Acad. Phila. II, 1: 175, 1848. In this subspecies the heads are congested in terminal rounded leafy-bracted clusters 2 to 4.5 cm. thick, heightening the effect of their large size. Occurrence of the subspecies is in southern Monterey and northern San Luis Obispo counties, California.

Hemizonia Halliana sp. nov. Annua, erecta, herbacea, praecipue glabra 2–5 dm. alta; caule fistuloso virgato candidulo-rubicundulo glaberrimo ad inflorescentiam foliaceo simplici usque a basi praeter medianum super dense corymboso; foliis usque

ad basim alternis lineari-lanceolatis sessilibus acutis vel obtusis utrimque glaberrimis in margine aliquanto scabro-ciliatis plerisque integris infimorum aliquantis patenter brevi-dentatis 5–8 cm. longis 3–9 mm. latis; corymbis ramos terminantibus planiusculis vel rotundatis; pedicellis (et bracteis) dense viscido-pubescentibus; involucro late hemisphaerico 5–7 mm. alto, squamis lanceolatis breve acuminatis dense glandulari-puberulis ad apicem superne aliquanto ciliolatis; paleis receptaculi inter radium et discum gerentibus plerisque 14–15 tres partes longinquitatum connatis; corollis luteis, radii 10–14, ligulis conspicuis quadrato-oblongis ca. 5.5 mm. longis, tubo viscido, disci 30–60, 3.5–4 mm. longis, faucibus ampliatis, tubo viscidulo; antheris luteis; acheniis radii 3.5–4 mm. longis obovato-prismaticis 4-nervalibus laevigatis nigris, nervo intus stricto (non incurvo), areola breviter rostrata, stipite magno-calloso; acheniis disci omnino sterilibus glaberrimis compressis calvis rarissimo cum rudimentari paleaceo pappo.

Type: 1.5 miles east of Cholame, northeastern San Luis Obispo County, California, on the dry flood plain of Cholame Creek, elevation 365 m. (1200 ft.), May 4, 1933, *Keck & Heusi 2170* (Dudley Herb.). A large set of isotypes awaits distribution. The habitat of the type was the bed of an alkaline "dry lake" which was colored for a length of at least 3 miles (nearly 5 km.) by this species, the dominant plant of the area. The heavy adobe soil was deeply cracked into a mosaic pattern of blocks giving the impression that the seedlings had germinated in standing water. It was collected here previously by Munz, no. 10157 (Po, UC), and determined as *Madia radiata* to which it bears a remarkable resemblance.

The description given above was based on the type collection. It may be amplified by consideration of plants from the only other known station for the species, on Lewis Creek, northeast of Lonoak (2 miles from intersection of Bitterwater road), Monterey County, Apr. 25, 1934, *Keck & Clausen 2774* (CI, DS). Only four individuals could be found here. These differ from the type only in being more pubescent in the upper half. Below they are essentially glabrous, but toward the heads these plants are more densely villous. Both collections are viscid within the inflorescence with small but very numerous glands that impart to the species a strong, balsamic odor, not unlike that of *H. floribunda* or *H. angustifolia.*

Hemizonia Halliana is the most unique of the ten species in its section. In common with *H. angustifolia* it has 10 gametic chromosomes and before this fact was known some of the characters of the heads had led to the supposition that a degree of relationship existed between the two species. But the shape of the ray-akene, the fistulous and gleaming stems, the entire and ciliolate leaves, the absence of pappus, not to mention the choice of

habitat, are characters new to the section. It is a pleasure indeed to associate the name of the late Dr. H. M. Hall, foremost student of the Madinae, with this outstanding plant.

Hemizonia, section **Centromadia** (Greene) comb. nov.—*Centromadia* as a genus, Greene, Man. Bot. S. F. Bay 196, 1894. A synopsis of this section follows:

Hemizonia pungens (Hook. et Arn.) Torr. et Gray subsp. **typica** nom. nov.—*Hartmannia ? pungens* Hook. et Arn. Bot. Beech. 357, 1838. *Hemizonia pungens* Torr. et Gray, Fl. N. Am. 2: 399, 1843. We wish to point out a coastal subspecies with smooth peduncular bracts and an interior subspecies with scabrous-puberulent bracts. Therefore it is important to fix the type of the species as regards this character. We have a photograph and a small fragment of the type which is in Hooker's Herbarium at Kew, collected in "California" by David Douglas. The type falls between the coastal and inland forms as regards scabridity, and doubtless came from the area in which the two meet. As Douglas did not collect to the east of the Inner Coast Range, as far as we know, it is possible that the type came from the northern side of San Francisco Bay where similar forms may be found. We interpret the type, then, as representing the coastal material which is, for the most part, very much smoother than the type specimen. This material therefore falls within subsp. *typica,* and may be found from Monterey County to Colusa County, reappearing in Siskiyou County, California, and adjacent Oregon. *Centromadia maritima* Greene is a synonym.

Hemizonia pungens subsp. **interior** subsp. nov. Foliis bracteisque scaberrimo-puberulis; capituliis subsolitariis; receptaculi squamis pungentibus.

Western borders of the Mohave Desert northward through the San Joaquin Valley, where it is very abundant, to San Joaquin County, California. *Type:* Nilegarden Station, 3 miles west of Manteca, San Joaquin County, June 26, 1932, *Keck 1503* (Dudley Herb.; isotypes CA, CI, Copenh, Po, UMontana).

Hemizonia pungens subsp. **laevis** subsp. nov. Foliis bracteisque parce setoso-ciliatis ceteroqui glaberrimis; capitulis parvis; receptaculi squamis obtusis vel acutiusculis non cuspidatis.

Southern California, from the vicinity of Los Angeles to San Bernardino and San Diego counties. *Type:* San Bernardino Valley, at an altitude of 300 m., July 8, 1916, *S. B. Parish 10972,* in University of California distribution no. 278 (Dudley Herbarium).

Hemizonia Parryi Greene subsp. **typica** nom. nov.—*H. Parryi* Greene, Bull. Torr. Club 9: 16, 1882. The type is from Calistoga Springs, Napa County, California. The upper leaves and bracts in particular are dotted with subsessile, granular glands, not scabrous, the subtending bracts often exceed the involucre in

length and the anthers are yellow. Presence of pappus and nonpungent chaff are specific characters. Typical *H. Parryi* occurs for the most part to the north of San Francisco Bay and is rather infrequent.

Hemizonia Parryi subsp. **rudis** (Greene) comb. nov.—*Centromadia rudis* Greene, Man. Bot. S. F. Bay 197, 1894. This subspecies differs from subsp. *typica* in the scabrid-puberulence of its leaves and bracts, and the absence of glands; the ligules frequently fade brick-red. Subsp. *rudis* has small heads and yellow anthers. It is a parallel ecotype to *H. pungens* subsp. *interior,* the scabrous puberulence of each being directly associated with their dry and hot inland habitats. Subsp. *rudis* occurs northeastward from San Francisco Bay well up into Sacramento Valley. The type came from Vacaville, Solano County.

Hemizonia Parryi subsp. **Congdoni** (Rob. et Greenm.) comb. nov.—*H. Congdoni* Rob. et Greenm. Bot. Gaz. 22: 169, 1896. *Centromadia Congdoni* C. P. Smith, Muhlenb. 4: 73, 1908. *C. pungens* var. *Congdoni* Jeps. Man. Fl. Pl. Calif. 1087, 1925. Here are included the non-glandular, non-scabrous forms of *H. Parryi* which form a natural geographic subspecies in the region from Contra Costa County to Salinas Valley, California. The anthers are yellow.

Hemizonia Parryi subsp. **australis** subsp. nov. Tota dense glandulari-puberula villosaque; capitulis parvis; ligulis flavis interdum in senectutibus rubescentibus; antheris nigris.

This occurs for the most part in the proximity of the coast from Los Angeles to northern Lower California; rare in Santa Barbara County. *Type:* Seal Beach, Orange County, California, Sept. 29, 1933, *Keck 2537* (Dudley Herb.). A large set of isotypes awaits distribution.

A hiatus of 270 km. separates subsp. *australis* from subsp. *Congdoni,* and there is a gap of 425 km. between subsp. *australis* and subsp. *typica* with which it bears a greater resemblance. Subsp. *australis* is more densely pubescent than subsp. *typica* and in addition its heads are surrounded by short bracts that fail to exceed them in length. This and subsp. *rudis* are the taller of the subspecies.

Hemizonia perennis (Greene) comb. nov.—*Centromadia perennis* Greene, Pittonia 3: 26, 1896. This species of Lower California, with strictly perennial base and sheathing lower leaves, is apparently most nearly allied to its geographic neighbor, *H. Parryi* subsp. *australis.* The type came from Cañon Salado, near San Antonio Del Mar, and was collected by T. S. Brandegee. We have seen a second collection, from Playa, San Vicente (35 km. south of Santo Tomas), *Cooper 77* (Dudley Herb.).

Hemizonia Fitchii Gray completes the list of members of this section.

Lagophylla

Lagophylla dichotoma Benth. subsp. **typica** nom. nov.—*L. dichotoma* Benth. Pl. Hartw. 317, 1849. The type came from Sacramento Valley, but we have seen specimens from as far north as Merced County only, thence southward to Tulare County and westward to the Inner Coast Range of Monterey, Fresno and San Benito counties. This is one of the very rare tarweeds.

Lagophylla dichotoma subsp. **minor** subsp. nov. Planta 1–3 dm. alta; involucri squamis lanceolatis eglandulosis infero dimidio dense albo-villoso, villis longis incurvis septatis praecipue prope marginem, apice acuminato parce villoso etiam puberulis; acheniis radii late oblanceolatis nigris laevigatis glaberrimis 0.8–1.3 mm. latis nervo ventrali evidenti.

Foothills of the Coast Range and Sierra Nevada surrounding the Sacramento Valley, extending westward into Lake and Napa counties, California. *Type:* bridge over Pope Creek, just south of Walters Spring, Napa County, May 29, 1933, *Keck 2338* (Dudley Herb.). A large set of isotypes awaits distribution.

Lagophylla ramosissima Nutt. subsp. **typica** nom. nov.—*L. ramosissima* Nutt. Trans. Am. Phil. Soc. II, 7: 391, 1841.

Lagophylla ramosissima subsp. **congesta** (Greene) comb. nov.—*L. congesta* Greene, Bull. Torr. Club 10: 87, 1883. *L. ramosissima* var. *congesta* Jeps. Fl. W. Mid. Calif. 539, 1901.

Layia

Layia Munzii sp. nov. Caule a basi ramoso erecto 2–3.5 dm. alto deorsum glabrato vel parce hispidulo superne viscido-puberulo cum paucis nigris stipitatis glandulis praecipue in receptaculo ornato immaculato; foliis utrimque glabratis scabrociliatis praecipue superioribus parce villosis et viscidis, radicalibus lineari-oblongis 2–4 cm. longis, 4–8 mm. latis, pinnatifidis, lobis brevi-oblongis integris, caulinis consimilibus supremis integerrimis; capitulis pedunculos apice nudiusculos terminantiis; involucro depresso-hemisphaerico 7–8.5 mm. alto, squamis linearioblongis crassiusculis glabratis vel parce hispidis ad apicem paullo glandulari-puberulis obtusis vel rotundis; paleis receptaculi plerisque 20–21, 6–6.5 mm. longis inter radium et discum gerentibus acutis liberis; corollis radii 10–15, ligulis conspicuis luteis apicibus albis obovatis 9–12 mm. longis, 6–9 mm. latis, lobis oblongis, tubo pubescenti 1–1.5 mm. longo; corollis disci ca. 75, 3.6–5 mm. longis, tubo puberulo, lobis hispidulis; antheris nigris; acheniis radii 2.8–3.5 mm. longis oblanceolatis compressissimis glabris glabratisve, disci 2.5–4 mm. longis dense strigosis circum areolam numerosis capillaceis villis gerentibus; pappo 2.3–3.4 mm. longo ochroleuco, paleis 9–11 lineari-lanceolatis attenuatis subintegerrimis.

Eastern San Luis Obispo County, California, from Cholame to Carriso Plains. *Type:* 32 miles (51 km.) east of Paso Robles, April 8, 1926, *P. A. Munz 10149* (Pomona College Herb.). Also taken at Cholame, *Wiggins 5784* (DS), and Carisso Plains, Mar. 31, 1910, *Condit* (DS, UC).

The type was collected on a botanical expedition in which several students, among them the writer, accompanied Dr. Munz, so there is a particular pleasure connected with naming this handsome plant *Layia Munzii.*

The closest relative of this species is probably *L. Fremontii* from which it is amply distinct by the absence of inner chaff on the receptacle, the presence of black glands on the herbage, in most cases by the shape of the pappus paleae, and by its different geographic distribution. It is about as close morphologically to *L. Jonesii,* in parallel fashion a restricted endemic of coastal San Luis Obispo County.

Layia leucopappa sp. nov. Erecta 15 cm. alta; caule pauci-rameo a basi parce hispidulo superne aliquanto viscidulo-puberulo cum paucis nigris stipitatis glandulis ornato; foliis ciliatis cum paucissimis prominentibus glandulis ornatis, supra parce villosis subtus glabris, inferioribus lineari-oblanceolatis plerisque 2 cm. longis, 4 mm. latis, pinnatifidis sessilibus, superioribus plerisque 1 cm. longis integerrimis; capitulis pedunculos apice nudulos terminantiis; involucro late hemisphaerico 6.3–7 mm. alto, squamis lineari-oblongis papillari-hirsutis et parce nigro-glandulosis, apice obtuso dilatatiusculo; paleis receptaculi ca. 20, 5.4–5.7 mm. longis inter radium et discum gerentibus acutis acuminatisve liberis; corollis radii 8–12, ligulis conspicuis ut videtur albis obovatis plerisque 8–9 mm. longis, disci ca. 60, 3.7–4.9 mm. longis undique pubescentibus; antheris flavis; acheniis radii 2.5–2.7 mm. longis oblanceolatis paullo arcuatis definite albo-sericeis, disci 2.5–2.9 mm. longis dense albo-sericeis circum areolam numerosis capillaceis villis gerentibus anguste turbinatis; pappo 1.7–2.2 mm. longo niveo, paleis 10 lanceolatis acutis acuminatisve subintegerrimis.

Known only from the type individual, collected near Comanche Point, San Joaquin Valley, California, April 3, 1927, by *E. Roy Weston 583* (Calif. Acad. Sci. Herb.). This locality is in Kern County, nearly 10 km. south of Arvin, and on the U. S. Geological Survey map is known as Tejon Hills.

The affinities of this species are with *L. Munzii, L. Jonesii* and *L. Fremontii.* It differs from the first of these in having white flowers, yellow anthers, plump, sericeous ray-akenes, and shorter, snow white, less elongated pappus of the texture of tissue paper. There is a resemblance between this species and *L. Jonesii* in pappus and ray-akenes; otherwise it is probably less similar to that species than is *L. Munzii.* In addition to those characters that separate *L. leucopappa* from *L. Munzii,* it is sepa-

rated from *L. Fremontii* by the absence of inner chaff, and the presence of black stipitate glands.

Layia glandulosa (Hook.) Hook. et Arn. subsp. **typica** nom. nov.—*Blepharipappus glandulosus* Hook. Fl. Bor. Am. 1: 316, 1833. *Layia glandulosus* Hook. et Arn. Bot. Beech. 358, 1838. This is the most polymorphic species of the genus, with an extensive range from British Columbia southward to Lower California and Arizona. Although variation extends to all parts of the plant, recombinations of the various characters are so frequent as to permit the proposal of but one segregate subspecies at present.

Layia glandulosa subsp. **lutea** subsp. nov. Corollae radii et disci luteae.

Restricted to San Benito County, California, where it is frequent. *Type:* Bear Valley, north of Pinnacles post office, May 1, 1933, *Keck 2017* (Dudley Herb.). Isotypes to be distributed.

This subspecies, with golden-yellow flowers, breaks down the universally applied key character of flower-color for *L. glandulosa,* but this had already become inevitable by the discovery of white forms assignable to the yellow *L. pentachaeta. Layia glandulosa* is distinguished by the ten broad pappus bristles, hispid pubescence, for the most part entire leaves and incidentally, by its almost universal occurrence on sandy soil.

Carnegie Institution of Washington.
Stanford University, October 30, 1934.

CRITICAL NOTES ON ERIOPHYLLUM LAG.—III

Lincoln Constance

The misinterpretation of Bahia leucophylla DC.

Perhaps no specific name applicable to a member of the genus Eriophyllum has been more diversely and erroneously interpreted than that of Bahia leucophylla of de Candolle. The original material was collected (cf. Prodr. 5: 657. 1836) by "Nee et Haenke," at "Nootka et Mullgrave" (Malaspina Expedition, 1791).

The specific name (as "leucophyllum") has been subsequently recombined as follows: Eriophyllum caespitosum var. leucophyllum Gray (Proc. Am. Acad. 19: 26. 1883), Eriophyllum leucophyllum Rydb. (Mem. N. Y. Bot. Gard. 1: 422. 1900), Eriophyllum leucophyllum Howell (Fl. N. W. Am. 1: 355. 1903), and Eriophyllum lanatum var. leucophyllum Carter et al. (Prel. Cat. Fl. Vancouver and Queen Charlotte isls., Prov. Mus., Victoria, B. C., 82. 1921).

Although still including (in most cases) the original collection, the name was so twisted or amplified as to embrace also one or more of the following phases of Eriophyllum lanatum var. integrifolium (Hook.) Smiley: